Executive Diary

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Paris 2015 agreement and the role of technological Institutes

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The Conference of Parties (countries) 21, on 12 December 2015 in Paris made a landmark agreement to control the GHG emissions to combat climate change and limit the global temperature increase below 2 degrees (also known as 2D -scenario). 191 countries have adopted the agreement and committed that the countries will prepare, communicate and maintain a national determined contribution, known as NDC, to achieve the goals. It took 21 meetings for the countries to come on to a common platform and reach this agreement. The agreement was kept open for signature by all parties (191 countries) from 21 April 2016 till 22 April 2017. It will be enforced once 50 % of the countries sign the agreement. On 4 November 2016, it has come into force as 55 % of the countries signed the agreement. Hence it is historical.

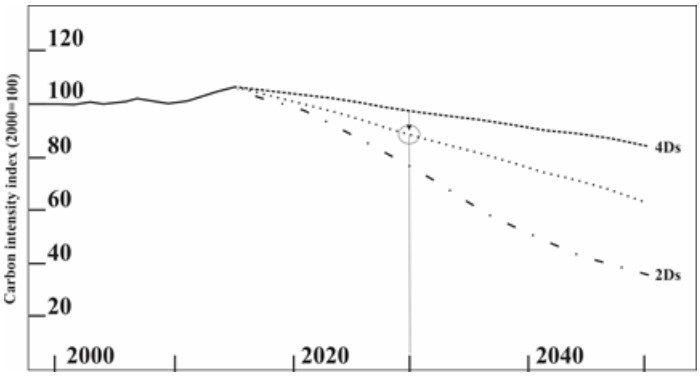

Fig. 2: Carbon intensity index –time-renewable energy relationship. (Carbon intensity index of energy production is measured as the quantity of carbon dioxide emitted per unit of energy production. This is measured in kilograms of CO_2 per kilowatt-hour).

The remaining countries delayed signing the document because they could not find alternate energy sources that can generate base-load electricity and work with an efficiency of > 80% and with low CO2 emissions. But now with the development in energy technologies, other countries are coming forward to sign and implement the carbon reduction process through renewable energy sources like geothermal. Last week Turkey agreed to implement Paris 2015 agreement by increasing the percentage of heating and cooling of homes using ground-source heat pumps and using geothermal hot waters for district heating. Thus the country can offset 80% of the energy supplied from fossil fuels through this decision.

Countries like India, located in tropical climate regions, can use heat from the ground for air-conditioning and save over 80 % of energy being used for this purpose from coal-based thermal power plants. Institutes like IITs can make a small contribution by adopting this method to cool and heat their homes, hostels, and working laboratories. Currently, IITH accommodates about 85 families and 4000 students (assuming life in hostels is normal.....back to non-Covid status) and annually consumes about 4 million kWh of electricity, generated from coal-based thermal power plants. There is no data on the energy consumption by the various laboratory units. Here the institutes like IITs need to create a cell to audit the energy consumption.

An energy audit is now becoming an important part of any industrial unit in the world. Coming back to the amount of power consumed by the residents of the campus, the amount of CO2 emitted is about 4 million kg annually (1 unit of power generated by coal-based thermal power plants releases 1 kg of CO2) At least 50% of this emissions can be avoided if ground source heat pumps are put in place for cooling and heating. Now, this technology is freely available across the countries, it is a question of policy and mindset of the implementing agencies to adopt this technology. Now that the new academic units are coming up on the campus with Japanese collaboration, district cooling and heating concept can be adopted right during the construction stage (this process can be implemented after the construction of the buildings but a small amount of cost can be saved if it is done during the construction stage). The advantage is, Japan has implemented this process of saving energy and reducing carbon footprint using ground-source heat pumps a long time ago in their country. IITs should showcase this technology so that other industrial and academic campuses can follow and help the country in successfully implementing the Paris 2015 agreement which the country has committed.

During the Covid period, although the Indian as the well global economy was badly hit (Figure 2) due to reduced electrical usage during the Covid-19 period starting in 2019, it is predicted by the International Energy Agency that global electricity demand will surge beyond 2019 level and concurrently increasing the CO2 emissions and the GDP. It is all the more important for India to plan a strategy contain CO2 emissions through promoting the earth's heat for cooling and heating purposes.

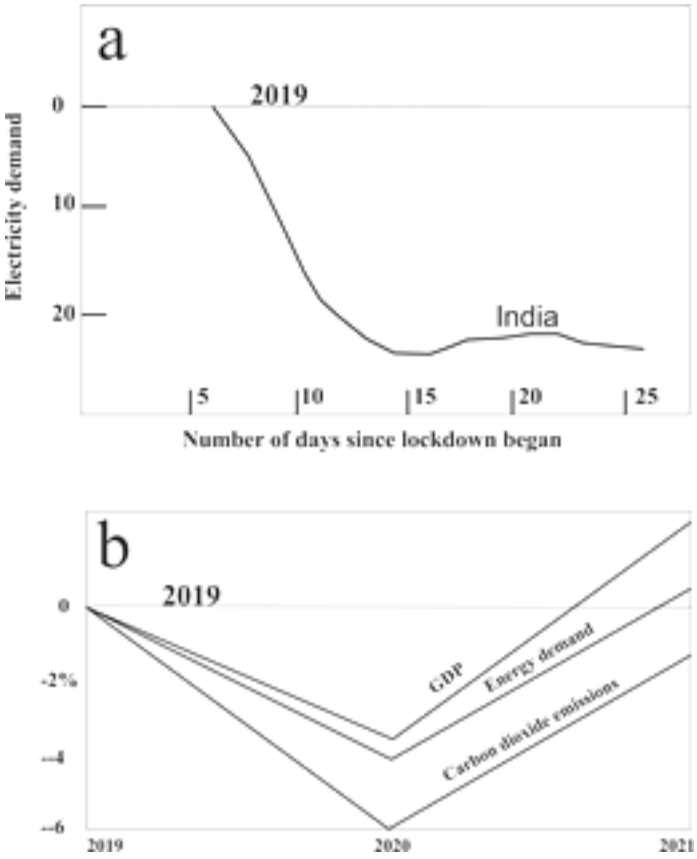

Fig. 3: Energy demand during Covid-19 period (a) and future global electricity demand and CO2 emissions (b) (adopted from International Energy Agency Global Energy review, 2021)

To initiate this strategy, IITs should have an energy audit unit to create a data bank on the usage of electricity and emissions. Small initiatives from industries and educational and research units will certainly help in bringing the curve to 3D level if not 2 D level (Figure 1).